This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (canceled).

Claim 2 (previously amended): A sensor for measuring the water content of bulk materials comprising:

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first and second elongate members, each having substantially identical shape and size so that the first and second members mate with one another and are bonded together to form a sensor;

sensor electronics mounted on the first member, the sensor electronics being protected by a housing, the sensor electronics being responsive to a direct current excitation for providing an output signal which is proportional to an amount of water present in a bulk material;

wherein the sensor electronics comprise:

an oscillator responsive to a direct current excitation, to provide a square wave signal;

a transmission line being coupled to receive the square wave voltage signal from the oscillator through a resistor, and a phase detector to detect a difference in phase between the square wave voltage signal provided by the oscillator and the signal provided to the transmission line, the phase detector being further constructed to provide an output signal indicative of the difference in phase between a square wave signal provided to the transmission line through the resistor and the response of the transmission line.

Claim 3 (original): The sensor as recited in claim 2 wherein the output of the sensor electronics is proportional to a water content of the bulk material.

Claim 4 (original): The sensor as recited in claim 2 wherein the phase detector comprises:

a semiconductor circuit having first and second inputs and an output, the output of the semiconductor circuit being indicative of the phase difference of the signals applied to the first and second inputs of the semiconductor circuit, the first input of the semiconductor circuit being coupled to the oscillator to receive the square wave voltage signal and the second input of the semiconductor circuit coupled to the transmission line;

a resistor and a capacitor providing a low pass filter connected to the output of the semiconductor circuit producing a DC voltage proportional to the phase difference of the signals provided to the inputs.

Claim 5 (previously amended): The sensor as recited in claim 2 where the dielectric constant of a bulk medium is sensed using a transmission line embedded in the bulk material;

the transmission line comprising traces on an elongated printed circuit board, the circuit board further comprising a semiconductor circuit.

Claim 6 (previously amended): A sensor for measuring water content of bulk materials, the sensor being powered by a direct current excitation, the sensor comprising:

an oscillator to provide a square wave voltage signal;

a transmission line having an input and an output, the transmission line input being coupled to receive the square wave voltage signal, the transmission line output being coupled to a phase detector;

the phase detector detecting a phase difference between the square wave voltage signal provided by the oscillator and the signal provided to the transmission line, the phase detector providing an output signal indicative of the phase difference caused by changes in moisture content of a medium surrounding the transmission line.

Claim 7 (currently amended): ~~The sensor as recited in claim 6~~ A sensor for measuring water content of bulk materials, the sensor being powered by a direct current excitation, the sensor comprising:

an oscillator to provide a square wave voltage signal;

a transmission line having an input and an output, the transmission line input being coupled to receive the square wave voltage signal, the transmission line output being coupled to a phase detector;

the phase detector detecting a phase difference between the square wave voltage signal provided by the oscillator and the signal provided to the transmission line, the phase detector providing an output signal indicative of the phase difference caused by changes in moisture content of a medium surrounding the transmission line wherein the phase detector comprises:

a semiconductor circuit having first and second inputs and an output, the output of the semiconductor circuit being indicative of a logical exclusive OR function of signals applied to the first and second inputs of the semiconductor circuit, the first input of the semiconductor circuit being coupled to the oscillator to receive the square wave voltage signal and the second input of the semiconductor circuit being coupled to the transmission line;

a low pass filter providing a direct current output proportional to moisture content.

Claim 8 (canceled).

Claim 9 (previously added): A method of measuring moisture in a bulk material, comprising:

providing a transmission line comprising in input and an output;

embedding the transmission line into a bulk material

providing a signal to the input of the transmission line;

providing a phase detector, the phase detector being operatively coupled to the output of the transmission line and a reference signal;

the phase detector measuring a phase difference between the reference signal and an output signal from the transmission line to determine a moisture content of the bulk material surrounding the transmission line.

Claim 10 (previously added): The method of claim 9, further comprising:

determining the dielectric constant of the bulk material by the phase difference to measure the moisture content of the bulk material.

Claim 11 (previously added): The method of claim 9 wherein a time domain reflectometry wave form is used to measure the phase difference.

Claim 12 (previously added): The method of claim 9 wherein a frequency domain wave form is used to measure the phase difference.

Claim 13 (previously added): The method of claim 9 wherein the transmission line is secured within a circuit board.

Claim 14 (previously added): The method of claim 9, further comprising:

insulating the transmission line from the bulk material being measured.

Claim 15 (previously added): The method of claim 9 further comprising:

using a circuit board to route signals, secure circuit components, and secure the transmission line.